ORDER NO. ARD-7707065C

Service Manual

Cassette Deck

RS-612US-E

Front Loading Stereo Cassette Deck with
Dolby* Noise-Reduction System, Timer Stand-By,
and Bias and Equalization Switches

RS-630U MECHANISM SERIES

Specifications (Catalog specifications for sales)

Power requirement:	AC; 90~109/110~125/200~219/220~250V, 50/60Hz Power consumption; 10W
Motor:	1-electronic speed control motor
Track system:	4-track, 2-channel stereo recording and playback
Tape speed:	4.8cm/s
Wow and flutter:	0.12% (WRMS), ±0.25% (DIN)
Frequency response:	CrO_2 tape; 30~15,000Hz 40~14,000Hz (DIN) Normal tape; 30~13,000Hz 40~12,000Hz (DIN)
Signal-to-noise ratio:	Dolby NR in; 65dB (above 5kHz) Dolby NR out; 55dB (signal level=max. recording level)
Fast forward and rewind time:	Approx. 90 seconds with C-60 cassette tape
Input:	MIC; sensitivity 0.25mV/applicable microphone impedance 400Ω~20KΩ LINE; sensitivity 60mV/input impedance 90KΩ DIN; sensitivity 0.25mV/input impedance 1.8KΩ LINE; output level 420mV/load impedance 22KΩ over
Head:	2-head system 1-super permalloy head for record/playback 1-double-gap ferrite head for erasure
Dimensions:	41.0cm(W)×13.6cm(H)×24.4cm(D)
Weight:	4kg

Specifications are subject to change without notice.

National Panasonic

LOCATION OF CONTROLS AND COMPONENTS

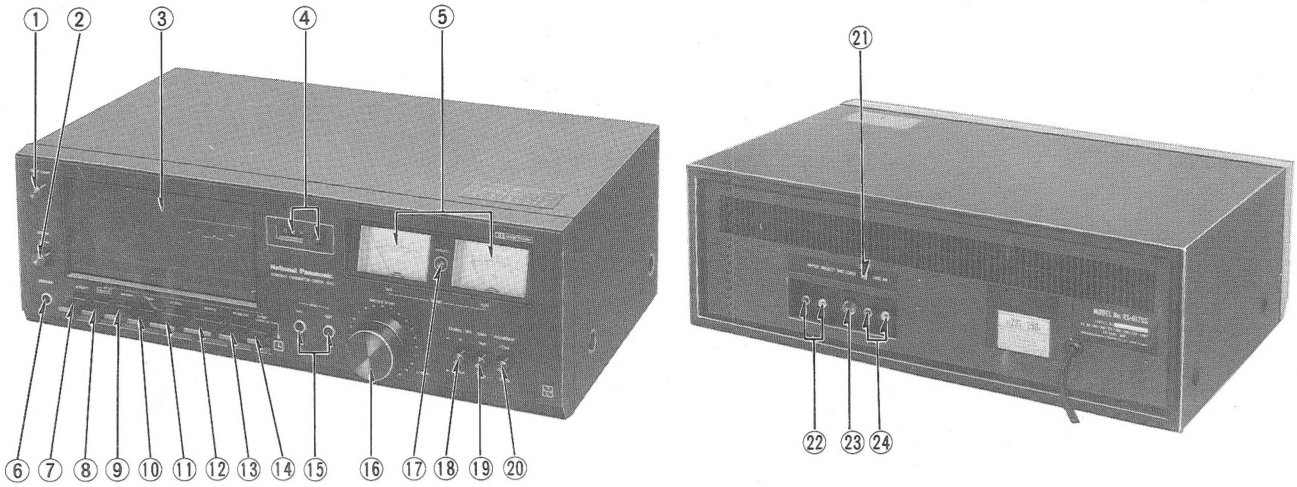

Fig. 1

① Door open button
② Power switch
③ Cassette compartment door
④ Tape counter and reset button
⑤ Level/VU meter
⑥ Headphones jack
⑦ Eject button
⑧ Record button
⑨ Rewind button
⑩ Fast forward button
⑪ Playback button
⑫ Stop button
⑬ Pause button
⑭ Timer stand-by button
⑮ Microphone jacks
⑯ Record level adjustment
⑰ Recording indication lamp
⑱ Dolby noise-reduction switch
⑲ Bias selector
⑳ Equalizer selector
㉑ Input selector
㉒ Line output jacks
㉓ Record/playback connection socket
㉔ Line input jacks

DISASSEMBLY INSTRUCTIONS

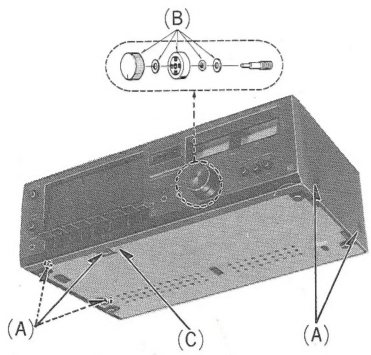

Fig. 2

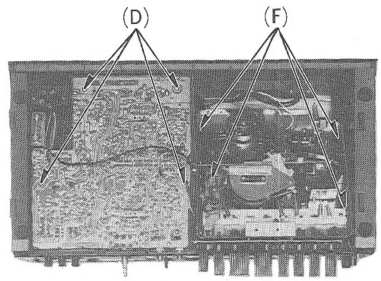

Fig. 3

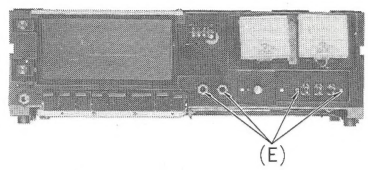

Fig. 4

Procedure	To remove ——.	Remove ——.	Pcs.	Shown in fig. ——.
1	Case cover	(A), (B)	5, 5	2
2	Bottom cover	(C)	1	2
3	Main P.C.B.	(D), (E)	4, 4	3, 4
4	Mechanism	(F)	4	3

ADJUSTMENTS

Before measuring and adjusting "Overall frequency response", "Overall distortion" and "Overall S/N ratio", confirm that the characteristics of 5 items below are within standard which have much relation to or influence on electrical performances above.

1. Head azimuth adjustment. 2. Bias current. 3. Playback gain. 4. Overall gain.
5. Playback frequency response.

I. TEST INSTRUMENTS

1. Prepare test instruments which are equivalent in accuracy to those shown below.
2. The test instruments should be inspected and corrected by specialists once every 6 months, because a long period of use without maintenance may increase errors in indication.
3. Warm-up the test instruments for 30 minutes and the set to be measured for 10 minutes before taking the measurements. If not, there may arise an error or difference between the initial value and the stabilized value measured after "aging".
4. Specifications of test instruments.

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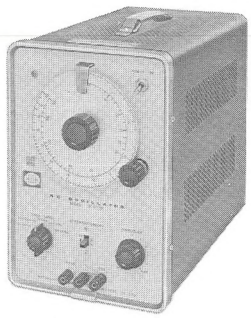
(1) Audio frequency oscillator

a. Oscillation froquency: 5 Hz ~ 500 kHz (5 ranges)
b. Frequency tolerance: ±(3% + 1 Hz)
c. Sine wave
 * Output voltage (at 25°C): 5 Vrms ±10% (without load)
 2.5 Vrms ±10% (with 600Ω load)
 * Output frequency response: Within ±0.2 dB, 20 Hz ~ 20 kHz
 Within ±0.5 dB, 5 Hz ~ 500 kHz
 * Distortion factor: Not more than 0.05%, 200 Hz ~ 20 kHz
 Not more than 0.5%, 5 Hz ~ 500 kHz
 * Output impedance: 600Ω unbalanced, within ±15%
 * Output attenuator: 0 dB, 20 dB, Error: within ±0.2 dB
d. Temperature in use of set: Temperature = 0 ~ 40°C, Humidity = 90% or less



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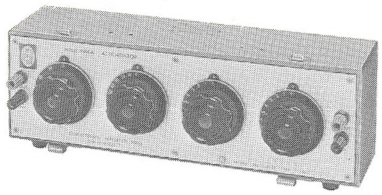
(2) Automatic-stop distortion meter (with vacuum tube voltmeter)

A. Distortion factor measurement
 a. Frequency (fundamental wave): 400 Hz, 1 kHz ±10%
 b. Measurement: 0.1 ~ 100% (6 ranges)
 c. Input: 50 mV ~ 50 V
 d. Fundamental wave attenuation: 60 dB or more
B. Level measurement
 a. Measurement: 1 mV (−60 dB) ~ 30 V (30 dB) (9 ranges)
 b. Frequency response (1 kHz basis): 20 Hz ~ 100 kHz ±0.3 dB
 c. Input impedance: 1 MΩ ±10%, less than 50 pF
 d. Error in indicated value: Within ±3% at 1 kHz
C. Output terminal
 a. Frequency response: 10 Hz ~ 100 kHz ±1 dB
 100 kHz ~ 1 MHz ±3 dB
 b. Output voltage: 1 Vrms ±10% (1 kHz sine wave)

(3) Attenuator

a. Input impedance: 600Ω unbalanced
b. Maximum attenuation: 121 dB
c. Minimum attenuation: 0.1 dB



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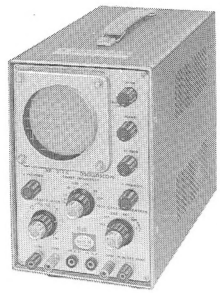
(4) Oscilloscope

a. Cathode ray tube: Effective ranges 8×8 cm
b. Vertical axis
   * Input sensitivity: 30 mV～30 V/cm
   * Frequency band: DC～2 MHz
   * Transient time: 180 ns.
   * Input impedance: 1 MΩ, 35 pF
c. Horizontal axis
   * Tuning range: 30 Hz～2 MHz
   * Sweep time: 1μs～100 ms/cm
   * External sweep: 1 Vp-p/cm or more



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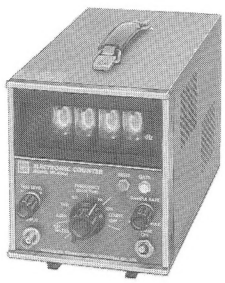
(5) Digital electronic counter

a. Number of figure: 4 (decimal system)
b. Input sensitivity: 100 mVrms
c. Input impedance: 1 MΩ, 40 pF
d. Frequency measurement range: 10 Hz～100 kHz
e. Counting time: 0.1, 1, 10 s



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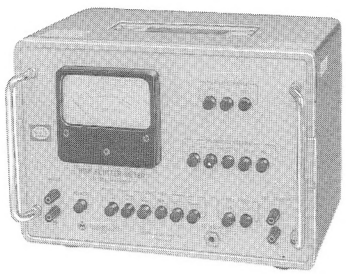
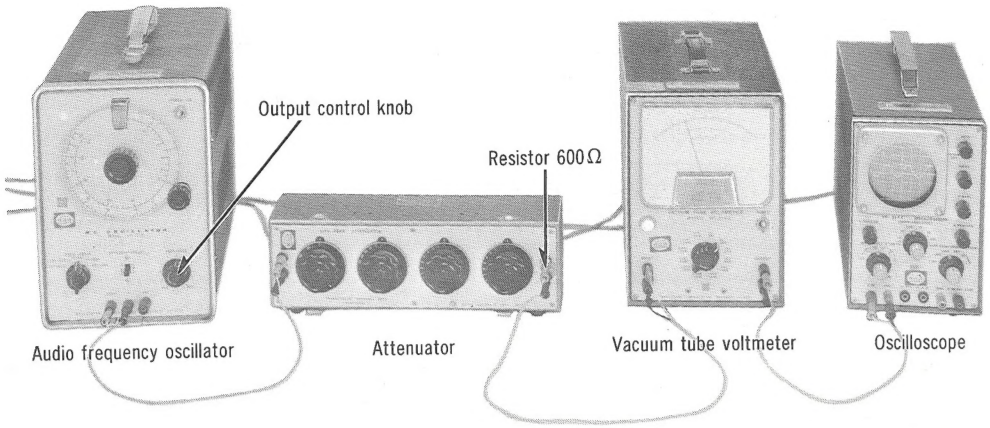
(6) Wow meter

a. Measured center frequency range: 3 kHz ±4%
b. Input level range: 30 mV～3 V
c. Input impedance: About 50 KΩ unbalanced
d. Measurement: 0.01～3% (5 ranges)
e. Indicator error: Maximum error in indicated value ±5% in each range.
f. Frequency response: Conforming to weighting curve characteristics (WRMS), JIS C5551.
   Flat characteristics (RMS)
   0.5～200 Hz, within −3 dB (4 Hz basis)
g. Meter indication system: Effective value indication, conforming to JIS C5551.
h. Meter response characteristic: About 5～7 sec.
i. Oscillation frequency: 3 frequencies (3 kHz, 3 kHz ±3%)
j. Temperature range: 0～40°C



II. MEASUREMENT CONDITIONS

1. Standard measurement conditions
   * Ambient temperature: 10～30°C (50～86°F)
   * Ambient humidity: 30～90% RH
   * Power voltage accuracy: ±3%
2. Position of tape recorder
   * When measuring, place the unit under test in a horizontal position.
3. Oscillator output voltage adjustment
   * Connect the equipments as shown in the following and adjust the oscillator output control knob for 1 V (f = 1 kHz) through the attenuator while keeping the attenuator at 0 dB.
   * When supplying a signal to the tape recorder amplifier, adjust the input level using the attenuator.



III. TEST TAPE

Test tape life

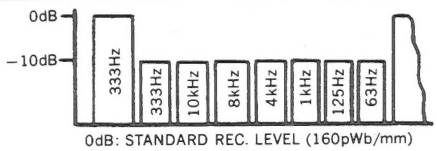
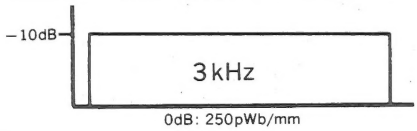
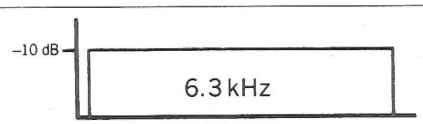
The more frequently the test tape is used, the more the tape characteristics will deteriorate (e.g. lowering of recorded level, worsening of frequency response particularly in high-frequency range, and an increase in wow due to tape elongation) until measured values become unreliable. Even in such a case when a tape is not used, but stored, for a long period of time, tape shows deterioration in performance because of self damagenetization due to storage conditions, etc.

Please refer to the tape life specification and use care not to use a tape longer than its rated life when servicing.

Frequence of use: Not more than 20 times for each tape length.

Storage period: Not more than 6 months.

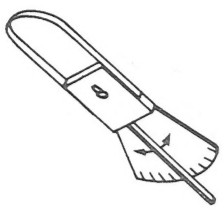
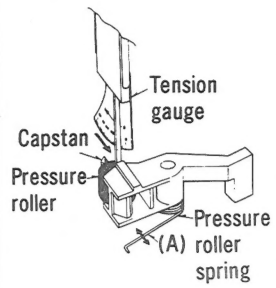
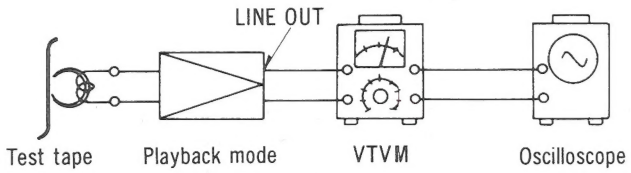
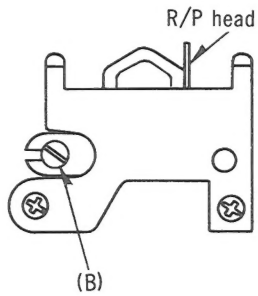
※ Test tape

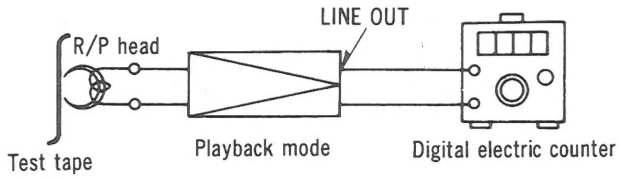
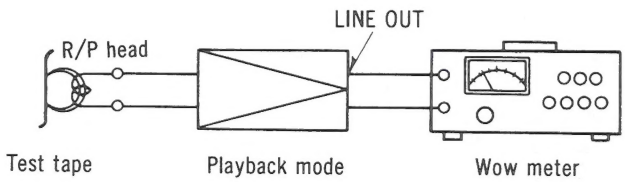
PARTS NO.	PARTS NAME	SPECIFICATIONS	REMARKS
C-FH	STANDARD REC. LEVEL & FREQ. RESPONSE TAPE	 0dB: STANDARD REC. LEVEL (160pWb/mm)	5 TIMES REPETITIVE RECORDING TAPE SPEED: 1-7/8 IPS. (4.8 CM/S), FULL TRACK (10 MIN.)
C-WAT	WOW & TAPE SPEED TAPE	 0dB: 250pWb/mm	TAPE SPEED: 1-7/8 IPS. (4.8 CM/S), FULL TRACK (45 MIN.)
C-AA	AZIMUTH TAPE	 0dB: 250pWb/mm	TAPE SPEED: 1-7/8 IPS. (4.8 CM/S), FULL TRACK (15 MIN.)
C-RA	REFERENCE BLANK TAPE (NORMAL)		UNRECORDED TAPE (20 MIN.)
C-RF	REFERENCE BLANK TAPE (CrO_2)		UNRECORDED TAPE (20 MIN.)

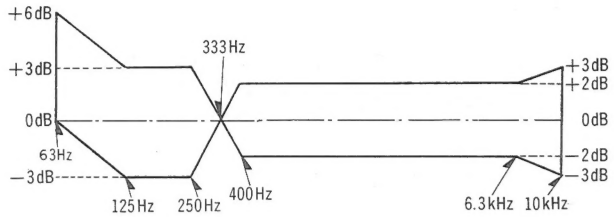
IV. MEASUREMENT & ADJUSTMENT METHOD

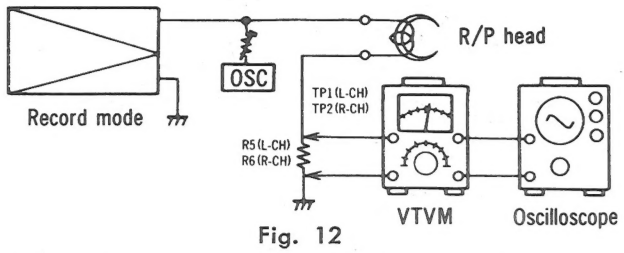
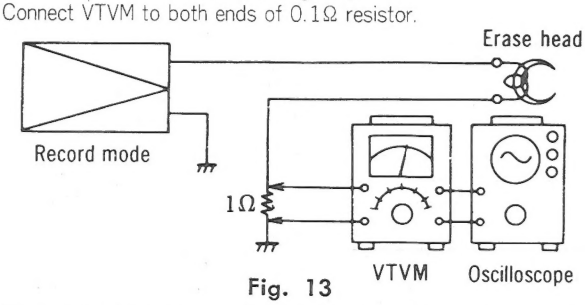
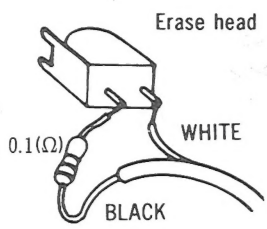
NOTE:

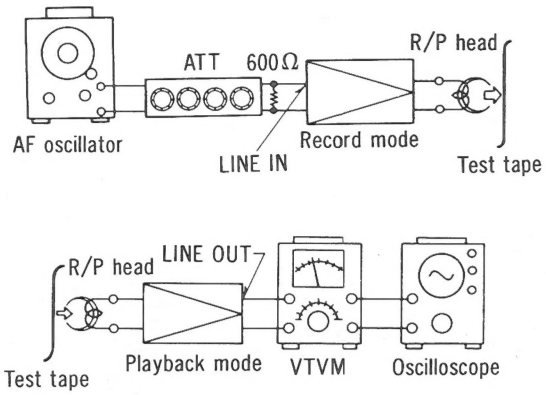
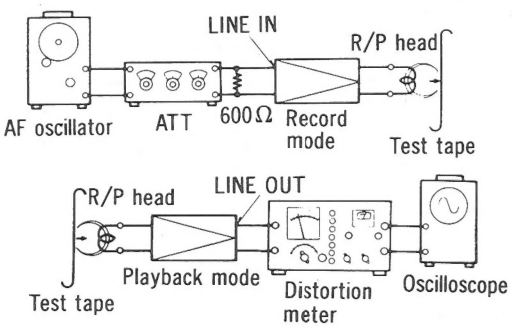
1. Make sure heads are clean.
2. Make sure capstan and pressure roller are clean.
3. Judgeable room temperature: 20±5°C (68±9°F)
4. Dolby NR switch: OUT
5. Bias selector: LOW
6. Equalizer selector: 120μS

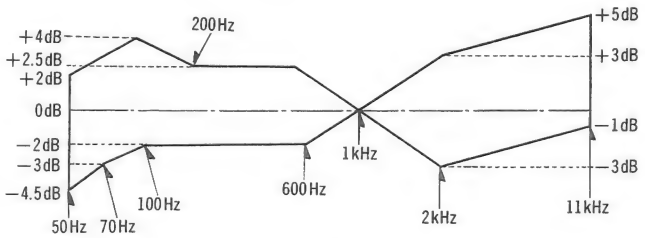
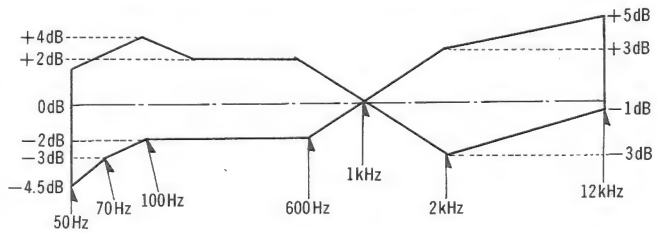
ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Pressure of pressure roller Equipment: * Tension gauge (max. 500 gr)  Fig. 5	1. Place UNIT into playback mode. 2. Hook the tension gauge to pressure roller lever and pull it in the direction of the arrow as shown in fig. 6. 3. Measure the tension at the moment when the pressure roller moves away from the capstan. **Standard Value: 400±50 gr** **Adjustment method** Bend the part (A) of the pressure roller spring in either direction shown by the arrow until the correct pressure is attained.	* Playback mode  Fig. 6
Takeup tension Equipment: * Cassette torque meter (SRK-CT or RP8063)	1. Mount cassette torque meter on UNIT. 2. Place UNIT into playback mode and read takeup torque. 3. Measure several times and determine the mean value. **Standard Value: 55±15 gr·cm**	* Playback mode
Head azimuth adjustment Equipment: * VTVM * Oscilloscope * Test tape (azimuth)···C-AA	**Record/playback head adjustment** 1. Test equipment connection is shown below.  Fig. 7 2. Play azimuth tape (C-AA 6.3 kHz). 3. Adjust record/playback head angle adjustment screw (B) in fig. 8 so that output level at LINE OUT becomes maximum. 4. Measure both channels, and adjust levels for equal output. 5. After adjustment lock head adjustment screw with lacquer.	* Playback mode  Fig. 8

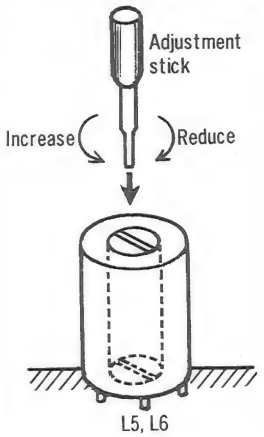
ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Tape speed Equipment: * Digital electronic counter or frequency counter (RP8067) * Test tape···C-WAT	**Tape speed accuracy** 1. Test equipment connection is shown below.  **Fig. 9** 2. Play test tape (C-WAT 3,000 Hz), and supply playback signal to frequency counter. 3. Measure this frequency. 4. On the basis of 3,000 Hz, determine value by following formula: $\text{Tape speed accuracy} = \left\{\frac{f-3{,}000}{3{,}000} \times 100\right\}\%$ where, f = measured value 5. Take measurement at middle section of tape. **Standard Value: ±1.5%** **Adjustment method** 1. Play the test tape (middle). 2. Adjust the tape speed adjustment VR shown in fig. 20 so that frequency becomes 3,000 Hz. **Tape speed fluctuation** Make measurements in same manner as above (beginning, middle and end of tape), and determine difference between maximum and minimum values and calculate as follows: $\text{Tape speed fluctuation} = \left\{\frac{f_1-f_2}{3{,}000} \times 100\right\}\%$ f_1 = maximum value f_2 = minimum value **Standard Value: 1%**	* Playback mode
Wow and flutter Equipment: * Wow meter * Test tape···C-WAT	1. Test equipment connection is shown below.  **Fig. 10** 2. Use wow test tape (3,000 Hz) and measure its playback signal on wow meter. 3. Wow and flutter is expressed in percentage and that measurement can be weighted by JIS network (WRMS). 4. Measure at middle section of test tape. **Standard Value: 0.17% (WRMS)**	* Playback mode

ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Playback frequency response Equipment: * VTVM * Oscilloscope * Test tape···C-FH	1. Test equipment connection is as same as "Head azimuth adjustment" but use the test tape (C-FH) instead of head azimuth tape (See fig. 11). 2. Place UNIT into playback mode. 3. Play frequency response test tape (C-FH). 4. Measure output level at 10kHz, 8kHz, 4kHz, 1kHz, 125Hz and 63Hz and compare each output level with standard frequency 333Hz, at LINE OUT. 5. Make measurement for both channels. 6. Make sure that the measured value is within the range specified in the frequency response chart. **Playback frequency response chart**  **Fig. 11** Adjustment 1. If the measured value decreases at high frequency range. * Short the connection point (A) or unsolder connection point (C). See fig. 19 on page 12. 2. If the measured value increases at high frequency range. * Short the connection point (B) or (C).	* Playback mode
Playback gain Equipment: * VTVM * Oscilloscope * Test tape···C-FH	1. Test equipment connection is shown in fig. 7. 2. Play standard recording level portion on test tape (C-FH 333Hz), and using VTVM measure the output level at LINE OUT jack. 3. Make measurement for both channels. Standard Value: 0.42V (−7dB) Adjustment 1. If measured value is not standard, adjust VR3 (L-CH), VR4 (R-CH) (See fig. 20 on page 12). 2. After adjustment, check "Playback frequency response" again.	* Playback mode
Playback S/N ratio Equipment: * VTVM * Oscilloscope * Test tape···C-FH * Empty cassette	1. Test equipment connection is shown in fig. 7. 2. Play standard recording level test tape (C-FH 333Hz) and read output level on VTVM. Refer to "Playback gain adjustment". 3. Place empty cassette (which has been cut) and play again. 4. Measure noise level at this time using VTVM, and determine ratio of this level to test tape output signal voltage (333Hz). Standard Value: Greater than 46dB	* Playback mode

ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
	An example calculation is shown below. A: Es = playback output signal voltage of test tape (333 Hz) B: En = playback output noise level Es = 0.42 V (−7 dB) En = 2.1 mV (−53 dB) $\text{S/N ratio} = \frac{Es}{En} = \frac{0.42\,V}{3.0\,mV} = 200$ $20 \log_{10} 200 = 46\,dB$ S/N ratio = Es(dB) − En(dB) = −7 − (−53) = 46 dB	
Bias current Equipment: * VTVM * Oscilloscope	1. Test equipment connection is shown below.  **Fig. 12** 2. Place UNIT into record mode, and bias selector to "LOW". 3. Read voltage on VTVM and calculate bias current by following formula: $\text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{10\,(\Omega)}$ **Standard value:** $500^{+250\mu A}_{-150\mu A}$ (LOW position) $600^{+250\mu A}_{-150\mu A}$ (HIGH position) 4. Adjust L3 (L-CH) and L4 (R-CH) (See adjustment part location on page 12). 5. Then changing the bias selector to "HIGH", confirm that bias current become greater by 25% than that for normal.	* Record mode * Be sure the ground end of the meter is connected to the ground end of the resistor. * When bias current is the adjusted on one channel only, note that bias current on the other channel may vary. * When L3 or L4 is the replaced, preset core position to bottom side of coil and then readjust optimum bias current.
Erase current Equipment: * VTVM * Oscilloscope * Resistor (0.1 Ω)	1. Connect 0.1 Ω resistor between ground side terminal of erase head ground lead wire removed (See fig. 14). 2. Connect VTVM to both ends of 0.1 Ω resistor.  **Fig. 13** 3. Place UNIT into record mode, and measure voltage across the 0.1 Ω resistor. 4. Determine erase current with the following formula: $\text{Erase current (A)} = \frac{\text{Voltage across both ends of } 0.1\,\Omega}{0.1\,\Omega}$ **Standard value:** 100 ± 40 mA (LOW position) 120 ± 50 mA (HIGH position)	* Record mode  **Fig. 14**

ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Overall gain Equipment: * AF oscillator * VTVM * ATT * Oscilloscope * Test tape (reference blank tape) C-RA for Normal	1. Test equipment connection is shown in fig. 15.  **Fig. 15** 2. Place UNIT into record mode, and equalizer selector to 120μS, bias selector to LOW (for normal tape). 3. Supply 1kHz signal (−24dB) from AF oscillator, through ATT, to LINE IN. 4. Adjust ATT until monitor level at LINE OUT becomes 0.42V (−7dB). 5. Using test tape (C-RA), make recording. 6. Playback recorded tape, and make sure the value at LINE OUT on VTVM becomes 0.42V. 7. If measured value is not 0.42V, adjust VR5 (L-CH), VR6 (R-CH) (See fig. 20 on page 12). 8. Repeat from step (2).	* Record/playback mode * Record level control ···MAX * Input selector···LINE IN * Standard input level: MIC ····· −72±3dB LINE IN −24±3dB DIN ····· −36±3dB
Level meter Equipment: * VTVM * Oscilloscope * AF oscillator * ATT	1. Supply 1kHz signal (−24dB) from AF oscillator, through ATT, to LINE IN jack. 2. Place UNIT into record mode. 3. Adjust ATT until monitor level at LINE OUT becomes 0.42V. 4. Short or open the connection point (D) and (E) so that VU meter indicates 0±1 VU (See fig. 19 on page 12).	* Record mode
Overall distortion Equipment: * Distortion meter * AF oscillator * ATT * Oscilloscope * Test tape (reference blank tape) C-RA for Normal C-RF for CrO_2	1. Test equipment connection is shown in fig. 16.  **Fig. 16** 2. Supply 1kHz signal to LINE IN and adjust ATT so that output level at LINE OUT indicates 0.42V (−7dB). 3. Make recording. 4. Playback and measure distortion factor of output signal.	* Record level control ···MAX * Input selector···LINE IN

ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
	5. When the distortion factor does not satisfy the standard, check the bias current. When the bias current is lower than standard, distortion will increase. Care should be exercised in the adjustment because the bias current also has an influence on the overall frequency response. Refer to "The overall frequency response" and "The bias current adjustment". **Standard Value: Less than 2.2% (Normal)** **Less than 3.2% (CrO_2)**	
Overall frequency response Equipment: * VTVM * AF oscillator * ATT * Test tape (reference blank tape) ··· C-RA for Normal ··· C-RF for CrO_2	**Note:** Before measuring, and adjusting, make sure of the playback frequency response (For the method of measurement, please refer to the playback frequency response). 1. Test equipment connection is shown in fig. 15. 2. Load reference blank test tape and place UNIT into record mode. 3. Supply 1 kHz signal from AF oscillator through ATT to LINE IN. 4. Adjust ATT so that input level is −20 dB below standard recording level (standard recording level = 0 VU). 5. At this time, LINE OUT level indicates 0.042 V. 6. Record each frequency 50 Hz, 120 Hz, 560 Hz, 1 kHz, 2 kHz, 3 kHz, 10 kHz and 11 kHz (12 kHz for CrO_2 tape) at the same level. 7. Playback and express in dB the difference between playback output level of each frequency based on playback output level of 1 kHz. 8. Make sure that the measured value is within the range specified in the overall frequency response chart. **Overall frequency response chart (Normal)**  **Fig. 17** 9. Set the bias selector to high and equalizer selector to 70μS. 10. Measure as same as manner above. 11. Make sure that the measured value is within the range specified in the overall frequency response chart for CrO_2 tape below. **Overall frequency response chart (CrO_2)**  **Fig. 18**	* Record/playback mode * Record level control ··· MAX

ITEM	MEASUREMENT & ADJUSTMENT	REMARKS
Overall frequency response (As a standard for adjustment)	**Adjustment—Using bias current** 1. When the frequency response between the middle and high frequency range becomes higher than the standard value, increase the bias current by turning L3 (L-CH) or L4 (R-CH) in direction of counter-clockwise (↺). 2. When it becomes lower, reduce the bias current by turning in direction of clockwise (↻).	
Overall S/N ratio Equipment: * VTVM * AF oscillator * ATT * Oscilloscope * Test tape (reference blank tape) ···C-RA	1. Test equipment connection is shown in fig. 15. 2. Supply 1 kHz signal to LINE IN and adjust ATT so that output level at LINE OUT indicates 0.42 V (−7 dB). 3. Make recording. 4. Make another recording without supplying signal (disconnect input plug to LINE IN). 5. Rewind to recorded part and playback. 6. Measure output signal level and no signal level (noise), and determine the ratio in decibels (dB). 7. The value is difference between "Playback S/N and overall S/N", but for decibel calculation refer to "Playback S/N measurement" on page 7. **Standard Value: Greater than 42 dB (without NAB filter)**	* Record/playback mode * Record level control ···MAX * Erase the tape with a bulk tape eraser. * Input selector···LINE IN
Dolby NR circuit Equipment: * VTVM * AF oscillator * ATT * Oscilloscope	1. Place UNIT into record mode, set the Dolby NR switch to OUT position and supply to LINE IN to obtain −34.5 dB at TP3 (L-CH), TP4 (R-CH) (frequency 5 kHz). 2. Confirm that the value at IN position is 7.5 (±1.5) dB greater than the value at OUT position of Dolby NR switch.	* Record mode * Record level control ···MAX * Stop the bias oscillation by unsoldering point (F) see fig. 19 on page 12.

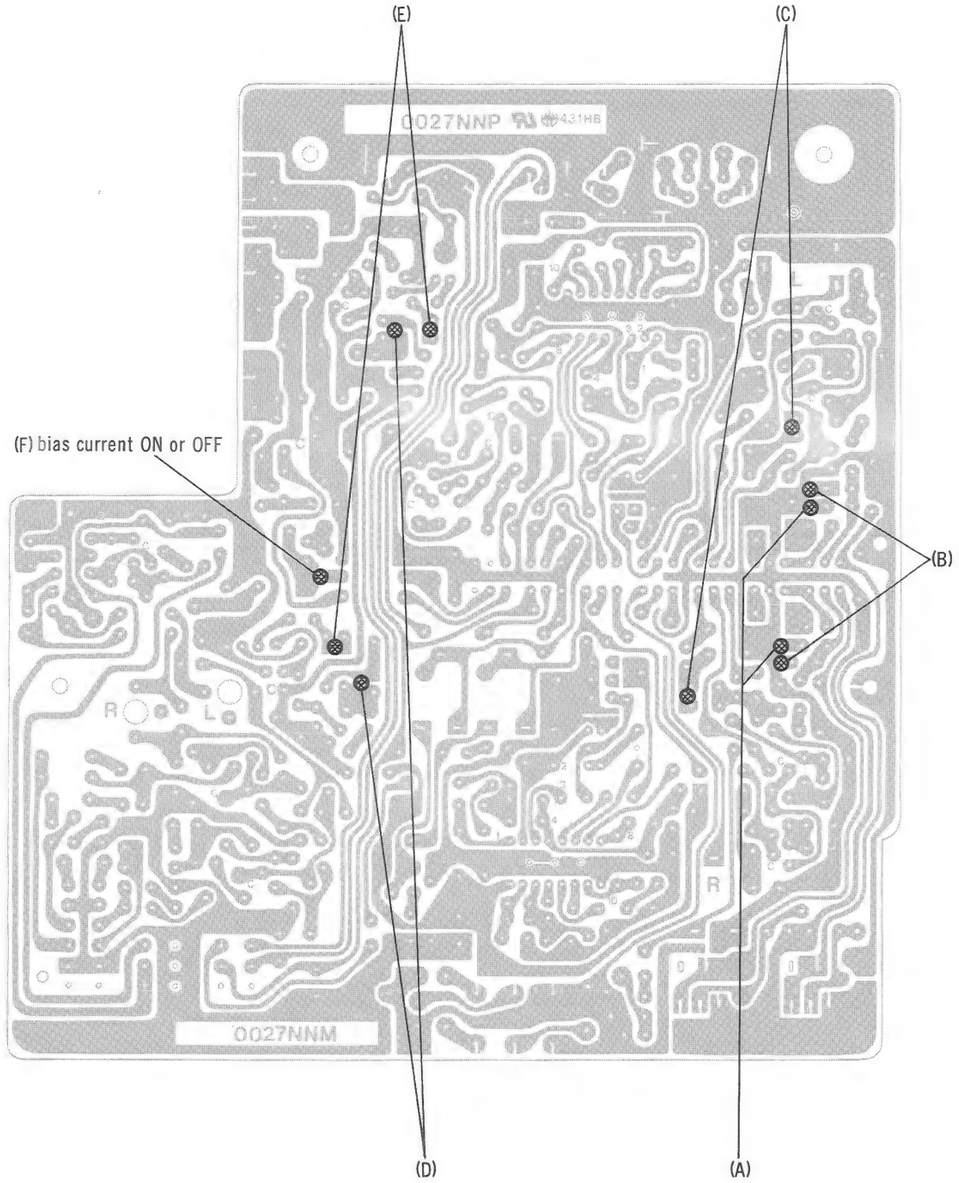


Fig. 19

ADJUSTMENT PARTS LOCATION

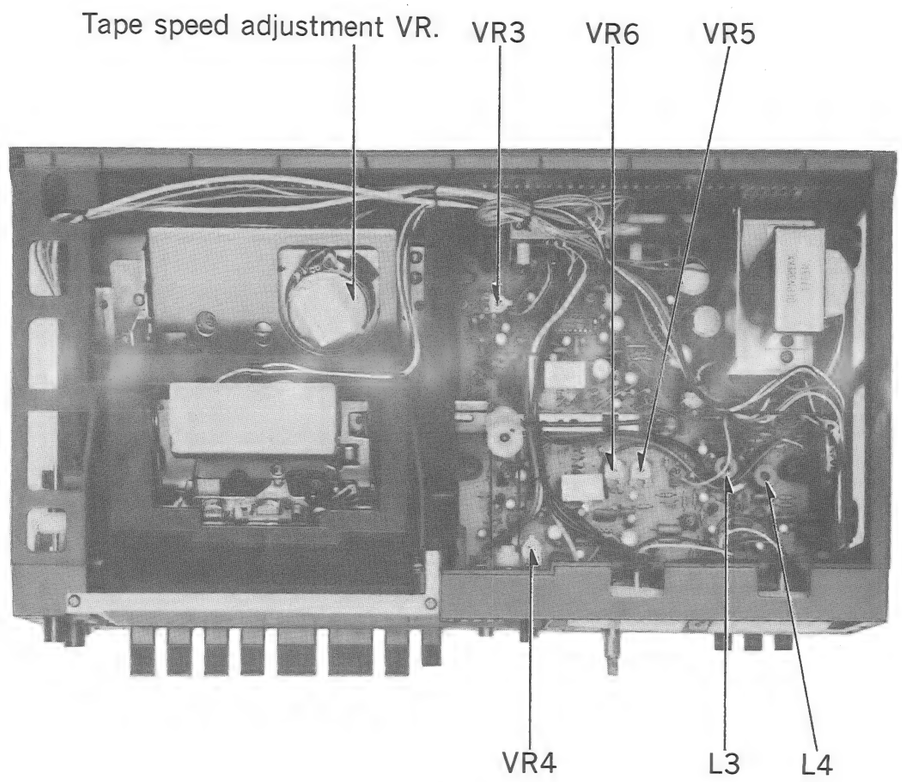
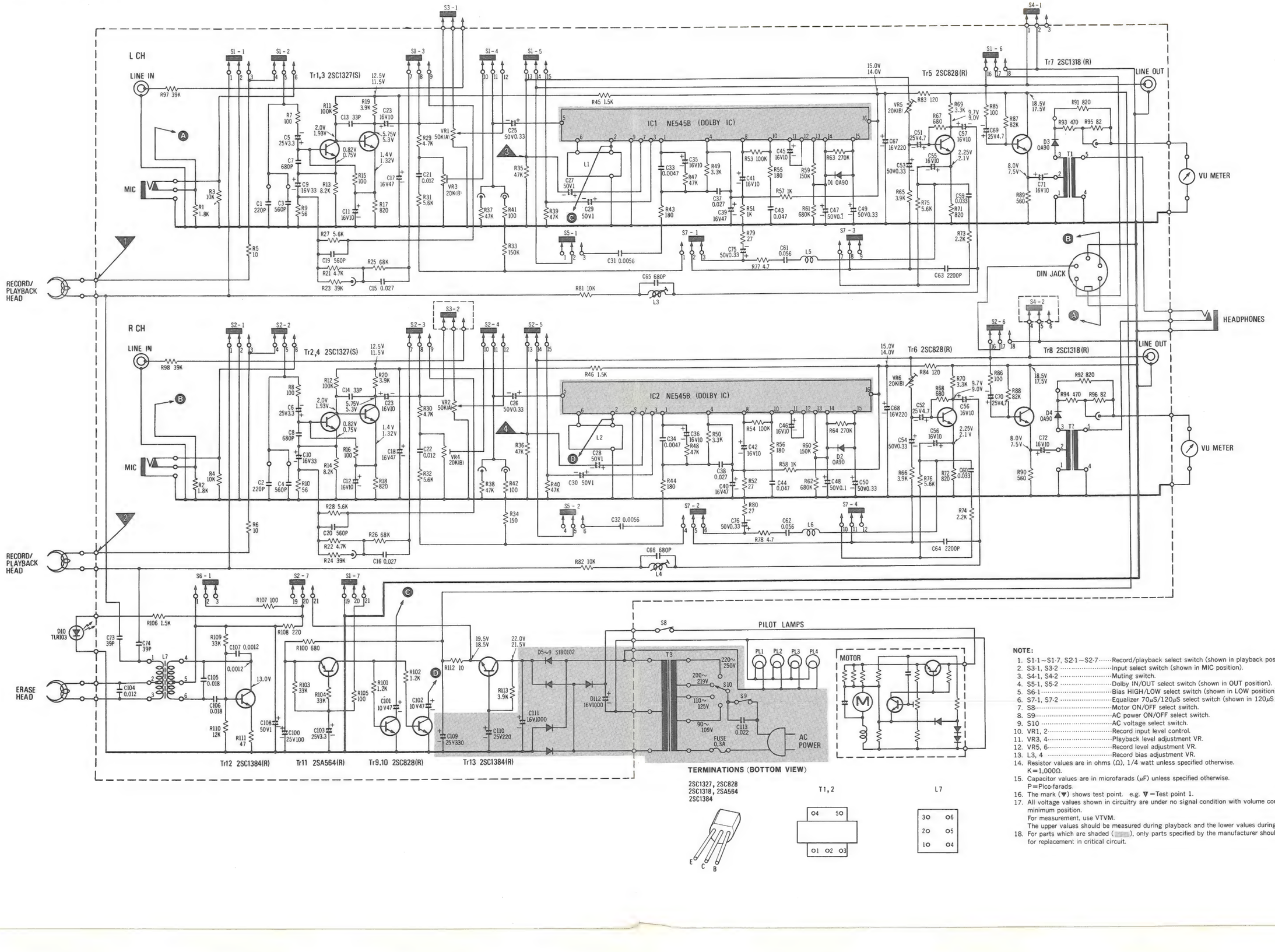


Fig. 20

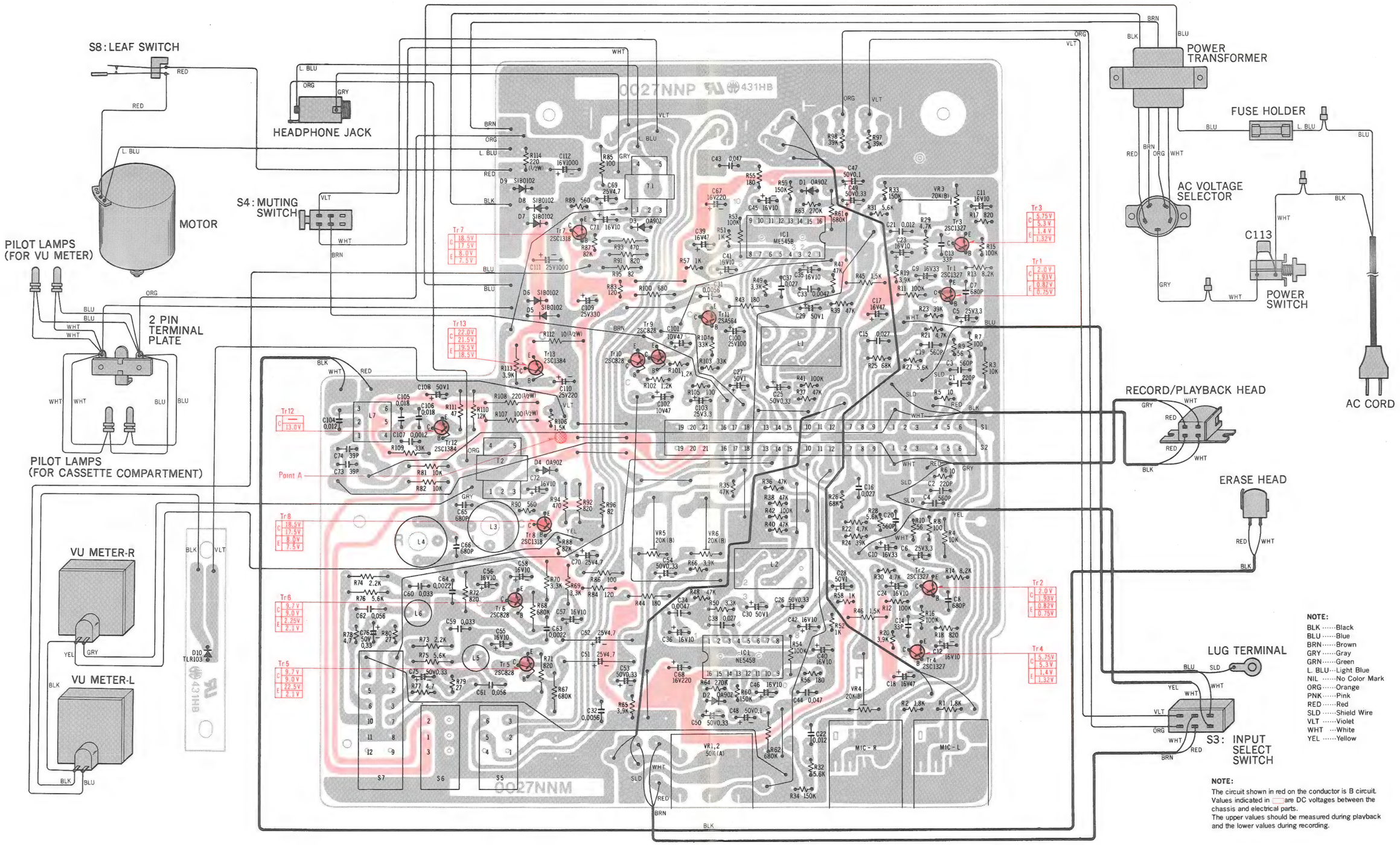
SCHEMATIC DIAGRAM MODEL RS-612US-E



NOTE:

1. S1-1~S1-7, S2-1~S2-7 ..... Record/playback select switch (shown in playback position).
2. S3-1, S3-2 ..... Input select switch (shown in MIC position).
3. S4-1, S4-2 ..... Muting switch.
4. S5-1, S5-2 ..... Dolby IN/OUT select switch (shown in OUT position).
5. S6-1 ..... Bias HIGH/LOW select switch (shown in LOW position).
6. S7-1, S7-2 ..... Equalizer 70μS/120μS select switch (shown in 120μS position).
7. S8 ..... Motor ON/OFF select switch.
8. S9 ..... AC power ON/OFF select switch.
9. S10 ..... AC voltage select switch.
10. VR1, 2 ..... Record input level control.
11. VR3, 4 ..... Playback level adjustment VR.
12. VR5, 6 ..... Record level adjustment VR.
13. L3, 4 ..... Record bias adjustment VR.
14. Resistor values are in ohms (Ω), 1/4 watt unless specified otherwise. K=1,000Ω.
15. Capacitor values are in microfarads (μF) unless specified otherwise. P=Pico-farads.
16. The mark (▼) shows test point. e.g. ▽=Test point 1.
17. All voltage values shown in circuitry are under no signal condition with volume control at minimum position.
    For measurement, use VTVM.
    The upper values should be measured during playback and the lower values during recording.
18. For parts which are shaded (▒), only parts specified by the manufacturer should be used for replacement in critical circuit.

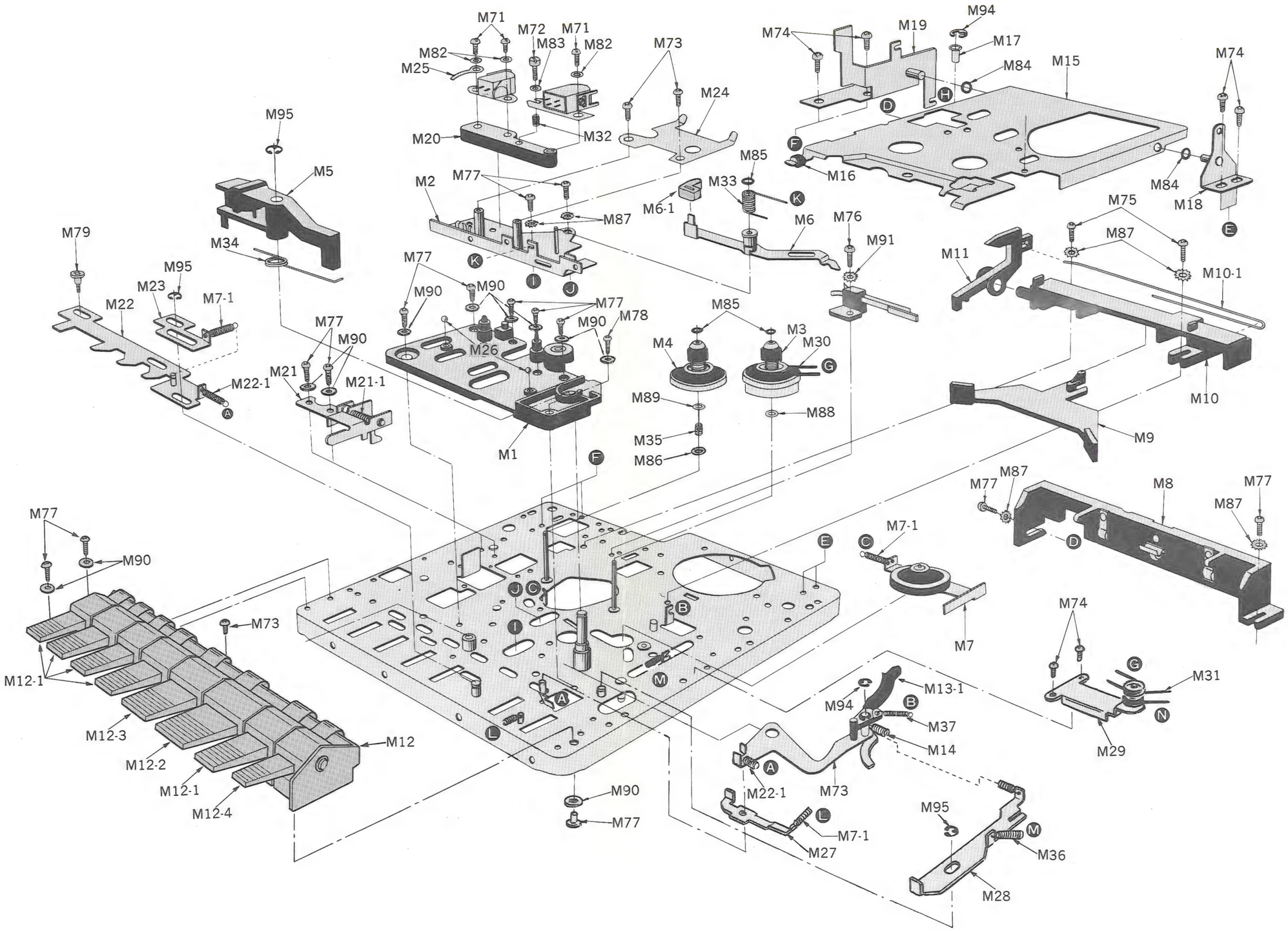
WIRING CONNECTION DIAGRAM MODEL RS-612US-E

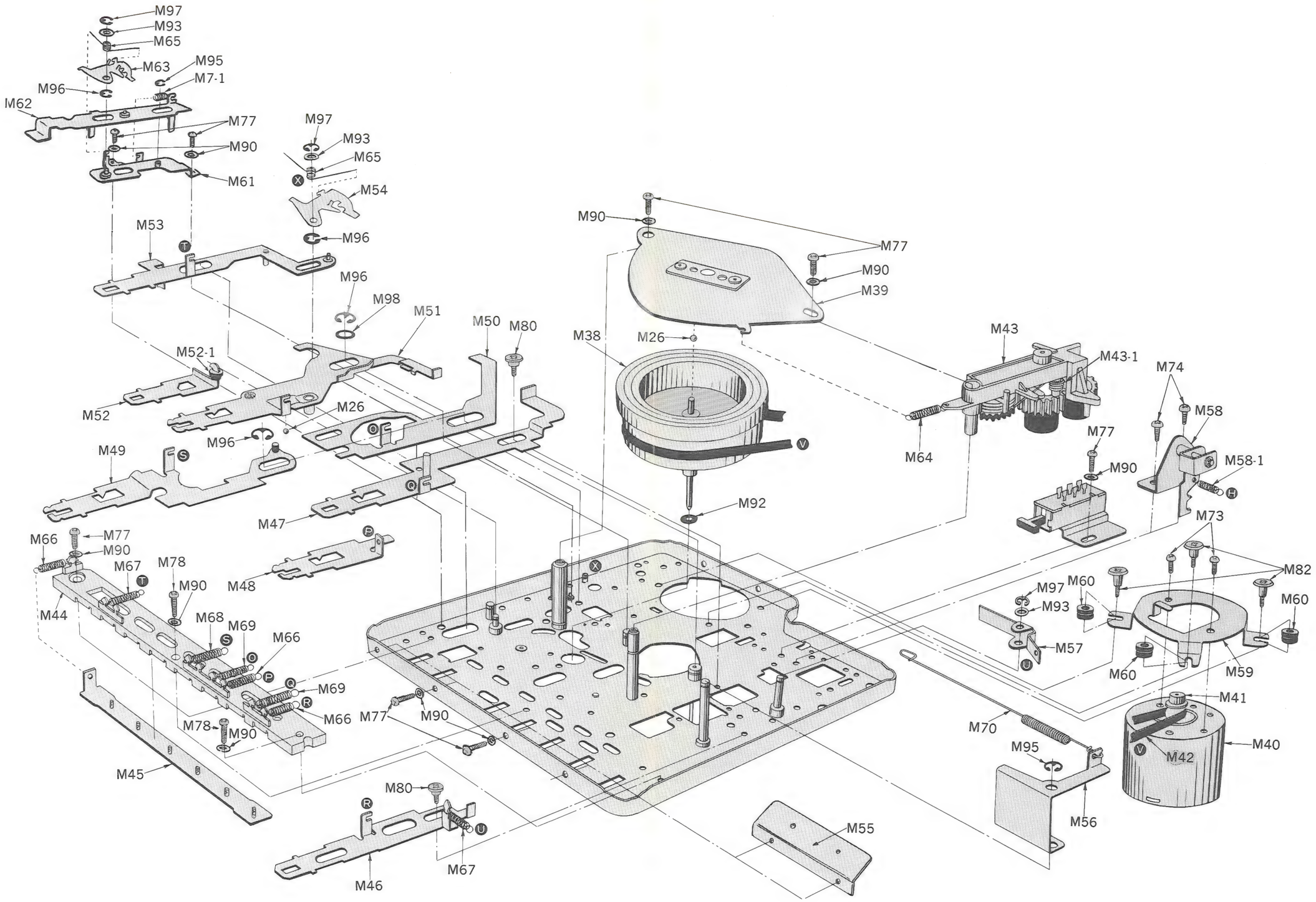


NOTE:
BLK ·····Black
BLU ·····Blue
BRN·····Brown
GRY·····Gray
GRN·····Green
L. BLU···Light Blue
NIL ·····No Color Mark
ORG·····Orange
PNK·····Pink
RED·····Red
SLD·····Shield Wire
VLT·····Violet
WHT ···White
YEL·····Yellow

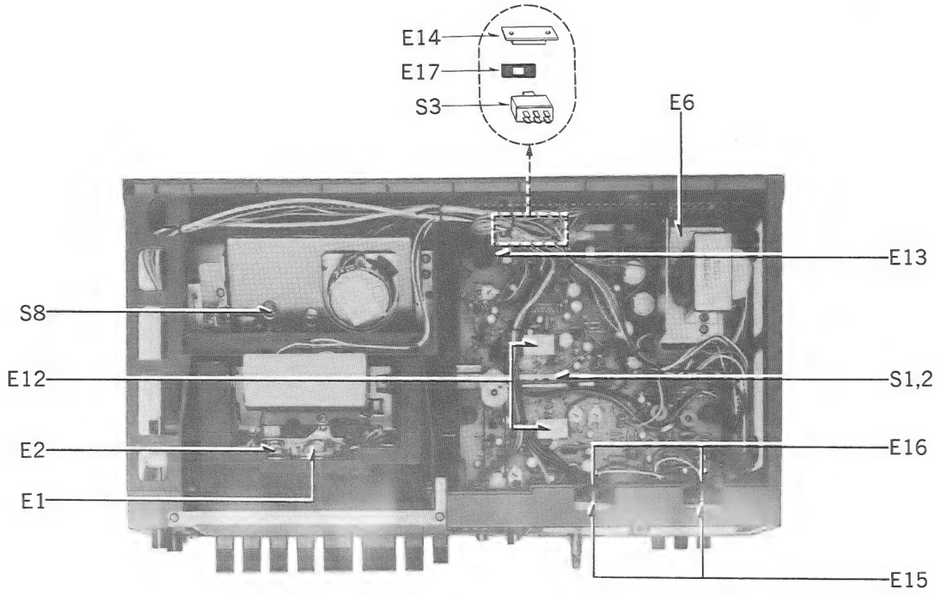
NOTE:
The circuit shown in red on the conductor is B circuit.
Values indicated in ▭ are DC voltages between the chassis and electrical parts.
The upper values should be measured during playback and the lower values during recording.

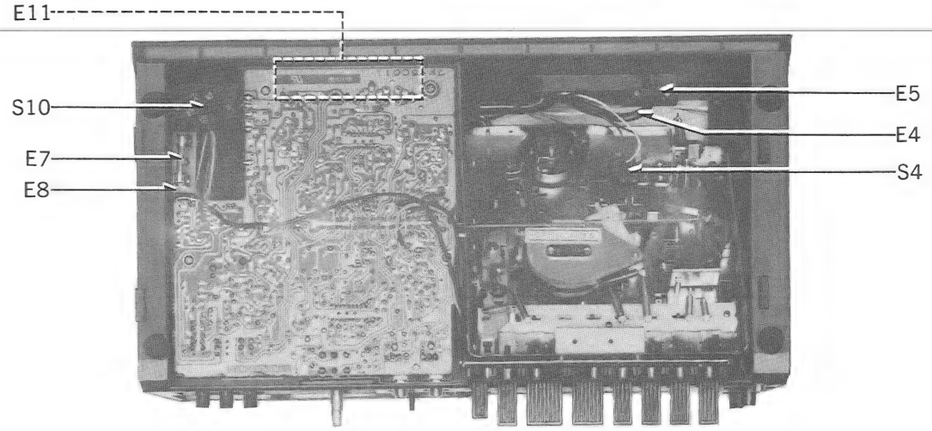
EXPLODED VIEWS

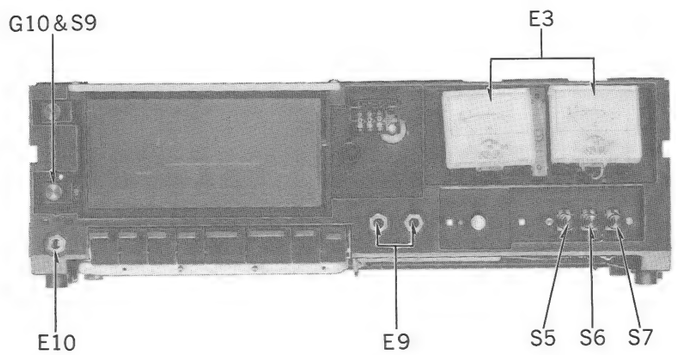



M97
M93
M65
M63
M95
M7-1
M96
M62
M77
M90
M61
M97
M93
M65
M54
M96
M53
M96
M98
M51
M50
M80
M52-1
M52
M26
M96
M49
M47
M48
M66
M77
M90
M67
M78
M90
M44
M68
M69
M66
M69
M66
M78
M90
M45
M80
M46
M67
M55
M90
M77
M90
M39
M38
M26
M92
M43
M43-1
M64
M74
M58
M77
M90
M58-1
M73
M82
M97
M93
M60
M57
M60
M60
M59
M41
M70
M95
M40
M42
M56

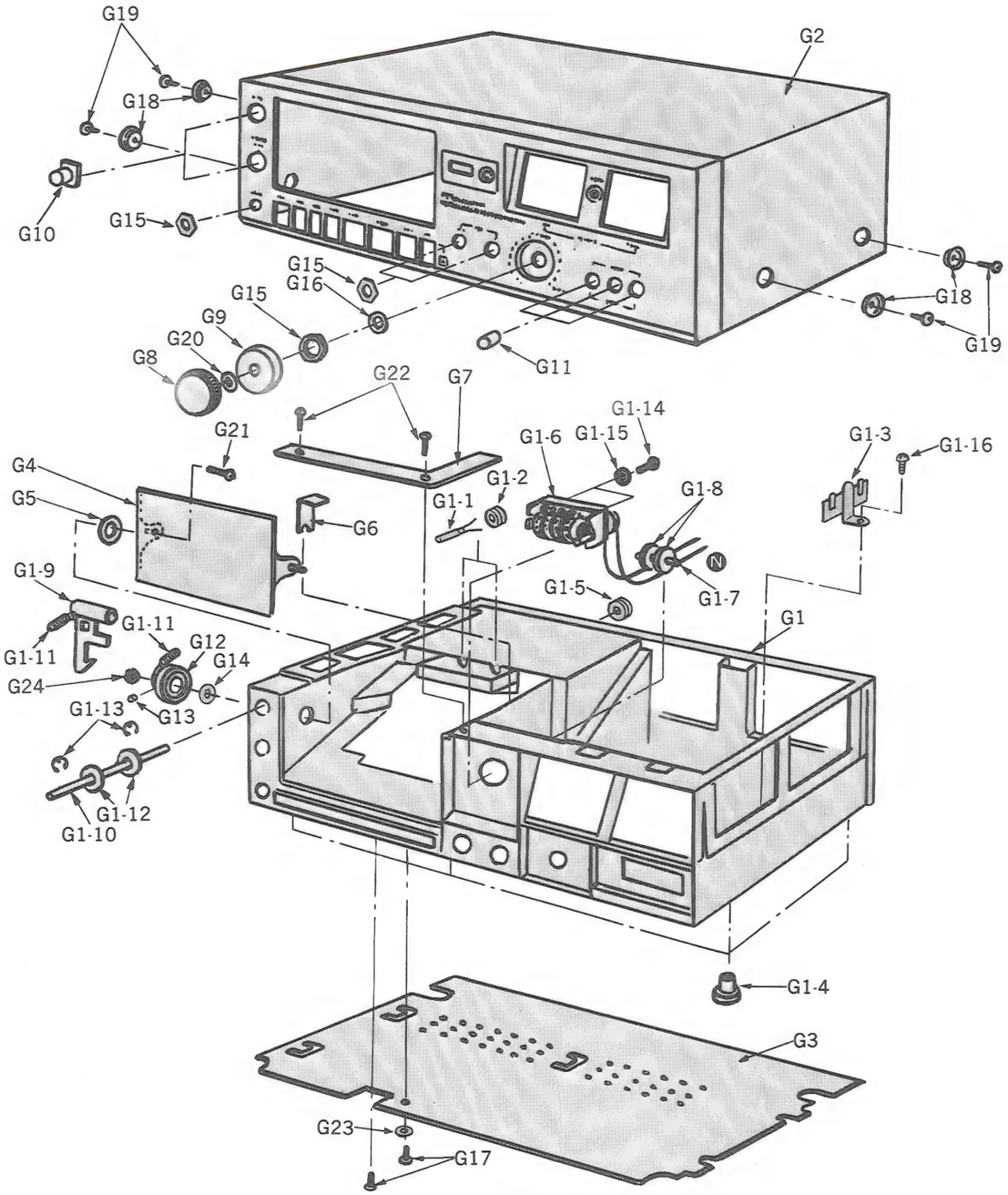
ELECTRICAL PARTS LOCATION







CABINET PARTS

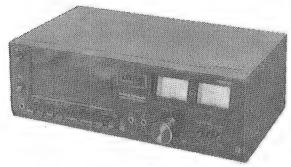


Printed in Japan.

REPLACEMENT PARTS LIST

MODEL RS-612US-E

National Panasonic



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NOTE:

1. Be sure to make your orders of replacement parts according to this list.
2. For parts which are shaded ( ), only parts specified by the manufacturer should be used for replacement in critical circuit.

NOTA:

1. Habrá que asegurarse que los pedidos de piezas de repuesto se hagan según esta lista.
2. Para las partes de la lista que están sombreadas ( ), deben ser usadas para hacer el reemplazo en los circuitos críticos solamente las partes que están especificadas por el productor.

NOTE:

1. Bien s'assutet de se conformer à la liste suivante pour les commandes de pièces de rechange.
2. Concernant les pièces dans les parties hachurées ( ), doivent être remplacées dans les circuits critiques uniquement par des pièces spécifiées par le fabricant.

HIENWEIS:

1. Bestellen Sie Ihre Ersatzteile genau nach dieser Liste.
2. Für diejenigen Positionen in der Ersatzteil-Liste, die auf schraffiertem Untergrund ( ) gedruckt sind, dürfen nur vom Hersteller zugelassenene Fabrikate als Ersatzteile in den kritischen Schaltkreisen verwendet werden.

按：

1. 關於代用零件之訂購，務請依照此表而行之爲荷。
2. 印有灰色( )的標號表示，祗有那些由製造公司所指定及證明的零件，才能用來代換。

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
			MECHANICAL PARTS		
M1		QXK1716	Upper Base Plate Assembly	1	
M2		QXK1717A	Head Base Plate Assembly	1	
M3		QXD0050	Takeup Reel Table Assembly	1	
M4		QXD0034	Supply Reel Table Assembly	1	
M5		QXLM010	Pressure Roller Assembly	1	
M6		QXL1048	Auto-Stop Detecting Lever Assembly	1	
M6-1		QBJ1538A	Auto-Stop Detecting Piece	1	
M7		QXLM008	Idler Assembly	1	
M7-1		QBT1558M	Idler Spring	5	
M8		QXZ0044	Cassette Retainer Assembly	1	
M9		QBJ1941A	Brake	1	
M10		QXT0004	Brake Holder Assembly	1	
M10-1		QBN1486	Brake Spring	1	
M11		QBJ1975B	Erase Safety Lever	1	
M12		QXB0438	Push Button Unit	1	
M12-1		QGO1303	Push Button	5	
M12-2		QGO1304	Stop Button	1	
M12-3		QGO1305	Playback Button	1	
M12-4		QGO1306	Timer Button	1	
M13		QXL1046	Auto-Stop Driving Lever Assembly	1	
M13-1		QML3061	Auto-Stop Driving Lever	1	
M14		QBT1822M	Eject Lever Spring	1	
M15		QXK1713	Cassette Base Plate Assembly	1	
M16		QBG1132	Stopper	1	
M17		QDP1595	Roller	1	
M18		QXA0292	Cassette Base Plate Holding Angle-A	1	
M19		QXA0465	Cassette Base Plate Holding Angle-B	1	
M20		QBJ2087B	Head Spacer	1	
M21		QXL0991	Up Lever Assembly	1	
M21-1		QBN1485	Up Lever Spring	1	
M22		QXR0179	Operation Rod Assembly	1	
M23		QMR1411	Operation Rod-C	1	
M24		QMF1814	Cassette Holder	1	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
M25	QTD1163	Cord Clamper	1	
M26	QDK1012	Steel Ball 2.5φ	3	
M27	QML3057	Timer Lever-A	1	
M28	QML3058	Timer Lever-B	1	
M29	QXPM002	Connection Pulley Assembly	1	
M30	QDB0215	Counter Belt-A	1	
M31	QDB0210	Counter Belt-B	1	
M32	QBC1103A	Head Spring	1	
M33	QBN1390	Auto-Stop Detecting Lever Spring	1	
M34	QBN1389	Pressure Roller Spring	1	
M35	QBC1272	Back Tension Spring	1	
M36	QBT1536DMA	Playback Lever Spring	1	
M37	QBT1489M	Auto-Stop Spring	1	
M38	QXF0063	Flywheel	1	
M39	QXH0095A	Flywheel Retainer	1	
M40	QDM0980XPAB	Motor	1	
M41	QXP0347B	Motor Pulley Assembly	1	
M41-1	XSN2+3	Screw ⊕2×3	1	
M42	QDB0141	Flywheel Belt	1	
M43	QXG1014E	Fast Wind Gear Assembly	1	
M43-1	QBN1447A	Gear Lever Spring	1	
M44	QGG0050A	Lever Guide	1	
M45	QXH0227	Push Button Lock Plate	1	
M46	QMR1446	Eject Rod	1	
M47	QXL0828	Record Lever Assembly	1	
M48	QML1953A	Rewind Lever	1	
M49	QXR0002B	Fast Forward Rod Assembly	1	
M50	QMR1307A	Fast Forward Lever-2	1	
M51	QXRM0002A	Playback Rod Assembly	1	
M52	QXR0241	Stop Rod	1	
M52-1	QBG1497A	Brake Rubber	1	
M53	QXR0268A	Pause Rod	1	
M54	QML2379B	Lock Lever	1	
M55	QMAM0071	Bottom Plate Holding Angle	1	
M56	QML2717	Record Lever-A	1	

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Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
M57	QML2712A	Eject Operation Lever	1	
M58	QXL0990	Click Lever Assembly	1	
M58-1	QBT1817	Click Lever Spring	1	
M59	QMA1952A	Motor Angle	1	
M60	QBG1055A	Motor Rubber Cushion	3	
M61	QXA0547	Timer Angle Assembly	1	
M62	QXL1044A	Timer Lever-C Assembly	1	
M63	QML3044	Lock Lever	1	
M64	QBT1485M	Fast Forward Lever Spring	1	
M65	QBN1271	Lock Spring	2	
M66	QBT1580M	Stop Lever Spring	3	
M67	QBT1604M	Eject Lever Spring	2	
M68	QBT1536DMA	Playback Lever Spring	1	
M69	QBT1486DM	Record Lever Spring	2	
M70	QBT1836	Record/Playback Spring	1	
M71	XSN2+12	Screw ⊕2×12	3	
M72	QHQ1199A	Step Screw	1	
M73	XSN26+3	Screw ⊕2.6×3	5	
M74	XTN3+8B	Tapping Screw ⊕3×8	8	
M75	XSN26+8	Screw ⊕2.6×8	2	
M76	XSN2+5	Screw ⊕2×5	1	
M77	XSN26+6	Screw ⊕2.6×6	22	
M78	XSN26+10	Screw ⊕2.6×10	3	
M79	QHQ1169	Step Screw	1	
M80	QHQ1168	〃	2	
M81	QMS1833	〃	3	
M82	XWA2B	Spring Washer 2φ	3	
M83	XWE2	Flat Washer 2φ	1	
M84	QBW2019	Poly Washer	2	
M85	QWQ1124	Snap Washer	3	
M86	QBW2012	Poly Washer	1	
M87	XWC26B	Lock Washer 2.6φ	6	
M88	QBJ3220	Poly Washer	1	
M89	QBW2013	〃	1	
M90	XWA26B	Spring Washer 2.6φ	21	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
M91	XWC2B	Lock Washer 2φ	1	
M92	QBJ3221	Poly Washer	1	
M93	QBK7121	Fiber Washer	3	
M94	XUC25FT	Stop Ring 2.5φ	2	
M95	XUC3FT	Stop Ring 3φ	5	
M96	XUC5FT	Stop Ring 5φ	4	
M97	XUC2FT	Stop Ring 2φ	3	
M98	QBK7130A	Fiber Washer	1	
		RESISTORS		
R1, 2	ERD25TJ182	Carbon Resistor 1.8KΩ 1/4W	2	
R3, 4	ERD25TJ103	〃 10KΩ 1/4W	2	
R5, 6	ERD25TJ100	〃 10Ω 1/4W	2	
R7, 8	ERD25TJ101	〃 100Ω 1/4W	2	
R9, 10	ERD25TJ560	〃 56Ω 1/4W	2	
R11, 12	ERD25TJ104	〃 100KΩ 1/4W	2	
R13, 14	ERD25TJ822	〃 8.2KΩ 1/4W	2	
R15, 16	ERD25TJ104	〃 100KΩ 1/4W	2	
R17, 18	ERD25TJ821	〃 820Ω 1/4W	2	
R19, 20	ERD25TJ392	〃 3.9KΩ 1/4W	2	
R21, 22	ERD25TJ472	〃 4.7KΩ 1/4W	2	
R23, 24	ERD25TJ393	〃 39KΩ 1/4W	2	
R25, 26	ERD25TJ683	〃 68KΩ 1/4W	2	
R27, 28	ERD25TJ562	〃 5.6KΩ 1/4W	2	
R29, 30	ERD25TJ472	〃 4.7KΩ 1/4W	2	
R31, 32	ERD25TJ562	〃 5.6KΩ 1/4W	2	
R33, 34	ERD25TJ154	〃 150KΩ 1/4W	2	
R35, 36, 37, 38, 39, 40				
	ERD25TJ473	〃 47KΩ 1/4W	6	
R41, 42	ERD25TJ104	〃 100KΩ 1/4W	2	
R43, 44	ERD25TJ181	〃 180Ω 1/4W	2	
R45, 46	ERD25TJ152	〃 1.5KΩ 1/4W	2	
R47, 48	ERD25TJ473	〃 47KΩ 1/4W	2	
R49, 50	ERD25TJ332	〃 3.3KΩ 1/4W	2	
R51, 52	ERD25TJ102	〃 1KΩ 1/4W	2	

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Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R53, 54	ERD25TJ104	Carbon Resistor 100KΩ 1/4W	2	
R55, 56	ERD25TJ181	〃 180Ω 1/4W	2	
R57, 58	ERD25TJ102	〃 1KΩ 1/4W	2	
R59, 60	ERD25TJ154	〃 150KΩ 1/4W	2	
R61, 62	ERD25TJ684	〃 680KΩ 1/4W	2	
R63, 64	ERD25TJ274	〃 270KΩ 1/4W	2	
R65, 66	ERD25TJ392	〃 3.9KΩ 1/4W	2	
R67, 68	ERD25TJ684	〃 680KΩ 1/4W	2	
R69, 70	ERD25TJ332	〃 3.3KΩ 1/4W	2	
R71, 72	ERD25TJ821	〃 820Ω 1/4W	2	
R73, 74	ERD25TJ222	〃 2.2KΩ 1/4W	2	
R75, 76	ERD25TJ562	〃 5.6KΩ 1/4W	2	
R77, 78	ERD25TJ4R7	〃 4.7Ω 1/4W	2	
R79, 80	ERD25TJ270	〃 27Ω 1/4W	2	
R81, 82	ERD25TJ103	〃 10KΩ 1/4W	2	
R83, 84	ERD25TJ121	〃 120Ω 1/4W	2	
R85, 86	ERD25TJ101	〃 100Ω 1/4W	2	
R87, 88	ERD25TJ823	〃 82KΩ 1/4W	2	
R89, 90	ERD25TJ561	〃 560Ω 1/4W	2	
R91, 92	ERD25TJ821	〃 820Ω 1/4W	2	
R93, 94	ERD25TJ471	〃 470Ω 1/4W	2	
R95, 96	ERD25TJ820	〃 82Ω 1/4W	2	
R97, 98	ERD25TJ393	〃 39KΩ 1/4W	2	
R100	ERD25TJ681	〃 680Ω 1/4W	1	
R101, 102	ERD25TJ122	〃 1.2KΩ 1/4W	2	
R103, 104	ERD25TJ333	〃 33KΩ 1/4W	2	
R105	ERD25TJ101	〃 100Ω 1/4W	1	
R106	ERD25TJ152	〃 1.5KΩ 1/4W	1	
R107	ERD50TJ101	〃 100Ω 1/2W	1	
R108	ERD50TJ221	〃 220Ω 1/2W	1	
R109	ERD25TJ333	〃 33KΩ 1/4W	1	
R110	ERD25TJ333	〃 12KΩ 1/4W	1	
R111	ERD25TJ470	〃 47Ω 1/4W	1	
R112	ERD50TJ100	〃 10Ω 1/2W	1	
R113	ERD25TJ392	〃 3.9KΩ 1/4W	1	

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Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
R114	ERC12GK221	Solid Resistor 220Ω 1/2W	1	
		VARIABLE RESISTORS		
VR1, 2	EWF15AF30A54	Variable Resistor 50KΩ (A)	2	
VR3, 4, 5, 6	EVLS3AA00B24	Semi-fixed Variable Resistor 20KΩ (B)	4	
		CAPACITORS		
C1, 2	ECKD1H221KB	Ceramic Capacitor 220pF	2	
C3, 4	ECKD1H561KB	〃 560pF	2	
C5, 6	ECEA25M3R3	Electrolytic Capacitor 3.3μF	2	
C7, 8	ECKD1H681KB	Ceramic Capacitor 680pF	2	
C9, 10	ECEA16V33	Electrolytic Capacitor 33μF	2	
C11, 12	ECEA16V10	〃 10μF	2	
C13, 14	ECCD1H330K	Ceramic Capacitor 33pF	2	
C15, 16	ECQM05273KZ	Mylar Capacitor 0.027μF	2	
C17, 18	ECEA16V47	Electrolytic Capacitor 47μF	2	
C19, 20	ECKD1H561KB	Ceramic Capacitor 560pF	2	
C21, 22	ECQM05123KZ	Mylar Capacitor 0.012μF	2	
C23, 24	ECEA16V10	Electrolytic Capacitor 10μF	2	
C25, 26	ECEA50MR33	〃 0.33μF	2	
C27, 28, 29, 30	ECEA50V1	〃 1μF	4	
C31, 32	ECQM05562JZ	Mylar Capacitor 0.0056μF	2	
C33, 34	ECQM05472JZ	〃 0.0047μF	2	
C35, 36	ECEA16V10	Electrolytic Capacitor 10μF	2	
C37, 38	ECQM05273JZ	Mylar Capacitor 0.027μF	2	
C39, 40	ECEA16V47	Electrolytic Capacitor 47μF	2	
C41, 42	ECEA16V10	〃 10μF	2	
C43, 44	ECQM05473JZ	Mylar Capacitor 0.047μF	2	
C45, 46	ECEA16V10	Electrolytic Capacitor 10μF	2	
C47, 48	ECEA50ZR1	〃 0.1μF	2	
C49, 50	ECEA50ZR33	〃 0.33μF	2	
C51, 52	ECEB35V4R7	〃 4.7μF	2	
C53, 54	ECEA50ZR33	〃 0.33μF	2	
C55, 56, 57, 58	ECEA16V10	〃 10μF	4	
C59, 60	ECQM05333KZ	Mylar Capacitor 0.033μF	2	

Ref. No.	Part No.	Part Name & Description	Pcs/ Set	Remarks
C61, 62	ECQM05563JZ	Mylar Capacitor 0.056μF	2	
C63, 64	ECKD1H222KZ	Ceramic Capacitor 0.0022μF	2	
C65, 66	ECQS1681KZ	Styrol Capacitor 680pF	2	
C67, 68	ECEA16V220	Electrolytic Capacitor 220μF	2	
C69, 70	ECEA35V4R7	〃 4.7μF	2	
C71, 72	ECEA16V10	〃 10μF	2	
C73, 74	ECCD1H390K	Ceramic Capacitor 39pF	2	
C75, 76	ECEA50ZR33	Electrolytic Capacitor 0.33μF	2	
C100	ECEA25V100	〃 100μF	1	
C101, 102	ECEA16V47	〃 47μF	2	
C103	ECEA25Z3R3	〃 3.3μF	1	
C104	ECQM05123KZ	Mylar Capacitor 0.012μF	1	
C105, 106	ECQM05183KZ	〃 0.018μF	2	
C107	ECQM05122KZ	〃 0.0012μF	1	
C108	ECEA50V1	Electrolytic Capacitor 1μF	1	
C109	ECEA25V330	〃 330μF	1	
C110	ECEA25V220	〃 220μF	1	
C111	ECEA25V1000	〃 1000μF	1	
C112	ECEA16V1000	〃 1000μF	1	
C113	ECQM6223KZ	Mylar Capacitor 0.022μF	1	
		TRANSISTORS		
Tr1, 2, 3, 4	2SC1327	Transistor	4	
Tr5, 6	2SC828	〃	2	
Tr7, 8	2SC1318	〃	2	
Tr9, 10	2SC828	〃	2	
Tr11	2SA564	〃	1	
Tr12, 13	2SC1384	〃	2	
		DIODES & RECTIFIERS		
D1, 2, 3, 4	OA90Z	Diode	4	
D5, 6, 7, 8, 9	SIB0102	Silicon Rectifier	5	
D10	TLR103	Illuminate Diode	1	

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
			INTEGRATED CIRCUITS		
IC1, 2		NE545B	Dolby Integrated Circuit	2	
			TRANSFORMERS		
T1, 2		QLT2D26X	Headphone Transformer	2	
T3		QLPN38EKX	Power Transformer	1	
			SWITCHES		
S1, 2		QSS1110	Slide Switch (Record/Playback Selector)	1	
S3		QSS1137	Slide Switch (Input Selector)	1	
S4		QSS2209T	Slide Switch (Muting)	1	
S5, 6, 7		QSWY301A	Push Switch (S5: Dolby, S6: Bias, S7: EQ.)	1	
S8		QSB0169M1	Leaf Switch (Motor ON/OFF)	1	
S9		QSW1206A	Push Switch (Power ON/OFF)	1	
S10		QSR1403H	Rotary Switch (Voltage Selector)	1	
			ELECTRICAL PARTS		
E1		QWY4113Z	Record/Playback Head	1	
E2		QWY2118	Erase Head	1	
E3		QSL1086RNM	VU Meter	2	
E4		QFC1204M	AC Power Cord	1	
E5		QTD1164	Cord Clamper	1	
E6		QMAM0077	Transformer Angle	1	
E7		XBA2E03NS5	Fuse (0.3A)	1	
E8		QTF1056	Fuse Holder	1	
E9		QJA0251H	Microphone Jack	2	
E10		QJA0231	Headphone Jack	1	
E11		QEJ5002H	Jack Board Assembly	1	
E12		QTSM0014	Shield Plate-1	2	
E13		QTSM0015	Shield Plate-2	1	
E14		QMAM0078	Switch Angle	1	
E15		XAMQ23P200N	Pilot Lamp	2	
E16		QBG1166	Pilot Lamp Cover	1	
E17		QBJ1239	Switch Mask	1	

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Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
			CABINET PARTS		
G1		QYMM0029	Main Body Case Assembly	1	
G1-1		XAMQ23P500N	Pilot Lamp	2	
G1-2		QBG1166	Lamp Cover	2	
G1-3		QJT2012	2 Pin Terminal Plate	1	
G1-4		QBG1447	Rubber Foot	4	
G1-5		QBJ1425A	Cord Bushing	1	
G1-6		QDC0076	Tape Counter	1	
G1-7		QMS1827	Shaft	1	
G1-8		QDP1628	Counter Pulley	2	
G1-9		QKJM0010	Lid Lock Piece	1	
G1-10		QMN8011	Lid Shaft	1	
G1-11		QBT1484M	Lid Spring-A	2	
G1-12		QBK7116	Fiber Washer	2	
G1-13		XUC2FT	Stop Ring 2ϕ	2	
G1-14		XSN3+8S	Screw ⊕3×8	3	
G1-15		XWA3B	Spring Washer 3ϕ	3	
G1-16		XTN3+8B	Tapping Screw ⊕3×8	2	
G2		QYCM0016	Case Cover	1	
G3		QKSM0010	Bottom Cover	1	
G4		QKFM0023H	Cassette Lid	1	
G5		QBPM0010	Lid Spring-B	1	
G6		QKJM0012	Lid Holder	1	
G7		QMAM0070	Front Angle	1	
G8		QYT0422	Volume Knob-A Assembly	1	
G9		QYT0423	Volume Knob-B Assembly	1	
G10		QYTM0018K	Push Button	2	
G11		QGOM0019	Function Button	3	
G12		QKJM0011	Lid Lock Plate	1	
G13		QBG1567	Cushion	1	
G14		QBW2055	Washer	1	
G15		QNQ1039	Nut	1	
G16		QWQ1133	Washer	1	
G17		XSN3+8S	Screw ⊕3×8	1	

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
G18		QWQ1131K	Washer	4	
G19		XTB4+10BFZ	Screw ⊕4×10	4	
G20		QBJ3299	Nylon Washer	1	
G21		XSN3+25S	Screw ⊕3×25	1	
G22		XTN3+10B	Tapping Screw ⊕3×10	2	
G23		XWG3	Flat Washer 3φ	1	
G24		XNG3ES	Nut 3φ	1	
			ACCESSORIES		
A1		RP050A	DIN Cord	1	
A2		QQT2098	Instruction Book	1	
			PACKINGS		
P1		QPNM0106	Inside Carton	1	
P2		QPAM0015	Inner Cushion	2	
P3		XZB40X60A05	Poly Bag	1	

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